

Puget Sound Air Pollution Control Agency

HEREBY ISSUES AN ORDER OF APPROVAL
TO CONSTRUCT, INSTALL, OR ESTABLISH

Registration No. 11656

Notice of
Construction No. 4546

Date JUL 14 1992

Modification of Glass Melting Furnace #3 including conversion to 100% oxygen-fuel firing at 6,000 cfm (400F).

JOHN R MINO

A
P
P
L
I
C
A
N
T

BALL-INCON GLASS PACKAGING CORP
5801 E MARGINAL WY S
SEATTLE WA 98134-2497

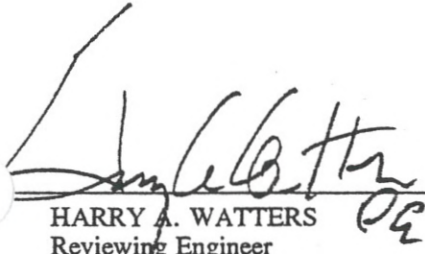
O BALL-INCON GLASS PACKAGING CORP
W 1509 S MACEDONIA
N MUNCIE
E IN 47302
R

INSTALLATION ADDRESS

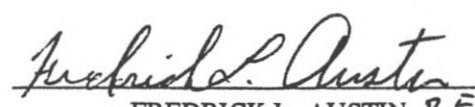
BALL-INCON GLASS PACKAGING CORP, 5801 E MARGINAL WY S, SEATTLE, WA, 98134

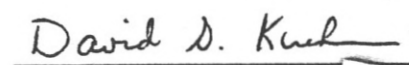
THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Air Pollution Control Agency to the applicant to install, alter or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of PSAPCA.
Compliance with this ORDER and its conditions does not relieve the owner or operator from the responsibility of compliance with Regulations I, II or III, RCW 70.94 or any other emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply. Section 5.05(e) of Regulation I requires that the owner or operator must develop and implement an operation and maintenance (O&M) plan to assure continuous compliance with Regulations I, II, and III.
3. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.
4. Ball-Incon shall conduct a source test to verify its emission estimates for emission banking (reference Section 6.08 of Regulation I) in accordance with PSAPCA's requirements for source tests.


HARRY A. WATTERS
Reviewing Engineer

MEJ


FREDRICK L. AUSTIN P.E.
Reviewing Engineer


ANITA J. FRANK
Air Pollution Control



Ball-InCon Glass Packaging Corp.

1509 South Macedonia Avenue, Muncie, IN 47302-3664 (317) 741-7000

Reply to: P.O. Box 4200, Muncie, IN 47307-4200

RECEIVED

June 12, 1992

JUN 15 1992

**PUGET SOUND AIR POLLUTION
CONTROL AGENCY**

Puget Sound Air Pollution Control Agency
200 West Mercer Street, Room 205
Seattle, Washington 98119

Attn: Mr. Harry Watters
Senior Air Pollution Engineer

Re: Notice of Construction/Application for Approval
Modification of Glass Melting Furnace #3
Ball-InCon, Seattle, Washington

Dear Mr. Watters:

As a followup to recent meetings and numerous discussions concerning the subject request and following the engineering department's guidance, attached you will find a packet of completed Forms Inventory and filing fee in support of our request for approval of construction. Our furnace #3 at this facility is currently scheduled for a major rebuild in January, 1993. In our effort to reduce operating costs and improve environmental performance of this operation, Ball-InCon is proposing to enlarge the furnace and convert it to a 100 percent oxygen-fuel firing furnace. Recent conversion of other regenerative glass melting furnaces in the industry has shown that the environmental benefits include major reductions in NO_x emissions and moderate reductions in particulate emissions.

The proposed schedule includes complete demolition of the melter and regenerator including the electric boosting to be replaced by a melter designed for combustion utilizing 100 percent oxygen-fuel system. Startup of the new furnace would be in February, 1993.



Glass Recycles

A subsidiary of Ball Corporation



Puget Sound Air Pollution Control Agency

June 12, 1992

Page 2

If there are any questions or additional information is required, I can be reached at 317/741-7116.

Sincerely,

A handwritten signature in cursive script, appearing to read "John R. Mino".

John R. Mino
Senior Engineer, Environmental

jw
Attach.

cc:
D. N. Coburn w/attach.
F. W. Glinka w/attach.
G. E. Hughes
F. E. Paladino
P. P. Hopko

Ms. Karen J. Nardi, Esq. w/attach
McCutchen, Doyle, Brown & Enersen
Three Embarcadero Center
San Francisco, CA 94111



PUGET SOUND AIR POLLUTION CONTROL AGENCY

ENGINEERING DIVISION

200 WEST MERCER, ROOM 205, SEATTLE, WASHINGTON 98119-3958

(206) 296-7334

RECEIVED

JUN 15 1992

Notice of Construction and Application for Approval

FORM P
SIDE 1

Be sure to complete items 39, 40, 41, & 43 before submitting Form P.

DATE 6/15/92 (AGENCY USE ONLY)
REG. NO. 11656 CONTROL AGENCY N/C NUMBER
SIC. NO. _____ VAR. NO. 4546
GRID NO. _____ COS. NO. _____
UTM _____

| | | |
|--|--|--|
| 1. TYPE OF BUILDING (Check) <input type="checkbox"/> New <input checked="" type="checkbox"/> Existing | 2. STATUS OF EQUIPMENT (Check) <input type="checkbox"/> New <input type="checkbox"/> Existing <input checked="" type="checkbox"/> Altered <input type="checkbox"/> Relocation | 7. APPLICANT Ball-InCon Glass Packaging Corp. |
| 3. COMPANY (OR OWNER) NAME Ball-InCon Glass Packaging Corp. | | 8. APPLICANT ADDRESS 5801 East Marginal Way South |
| 4. COMPANY (OR OWNER) MAILING ADDRESS 1509 S. Macedonia, Muncie, IN 47302 | | 9. INSTALLATION ADDRESS Same |
| 5. NATURE OF BUSINESS Glass Container Manufacturing | | 10. TYPE OF PROCESS Glass Melting Furnace |

EQUIPMENT (ENTER ONLY NEW EQUIPMENT OR CHANGES. ENTER NUMBER OF UNITS OF EQUIPMENT IN COLUMN 'NO. OF UNITS.' COMPLETE FORM 'S' FOR EACH ENTRY.)

| 11. NO. OF UNITS | SPACE HEATERS OR BOILERS (Complete Form S-A) | 14. NO. OF UNITS | OVENS | 15. NO. OF UNITS | MECHANICAL EQUIP. | 16. NO. OF UNITS | MELTING FURNACES |
|------------------|--|------------------|-----------------------|------------------|----------------------|------------------|-----------------------|
| (a) _____ | | (a) _____ | CORE BAKING OVEN | (a) _____ | AREAS | (a) _____ | POT |
| 12. NO. OF UNITS | INCINERATORS (Complete Form S-B) | (b) _____ | PAINT BAKING | (b) _____ | BULK CONVEYOR | (b) _____ | REVERBERATORY |
| (a) _____ | | (c) _____ | PLASTIC CURING | (c) _____ | CLASSIFIER | (c) _____ | ELECTRIC INDUC/RESIST |
| 13. NO. OF UNITS | OTHER SYSTEMS | (d) _____ | LITHO COATING OVEN | (d) _____ | STORAGE BIN | (d) _____ | CRUCIBLE |
| (a) _____ | | (e) _____ | DRYER | (e) _____ | BAGGING | (e) _____ | CUPOLA |
| (b) _____ | DEGREASING, SOLVENT | (f) _____ | ROASTER | (f) _____ | OUTSIDE BULK STORAGE | (f) _____ | ELECTRIC ARC |
| (c) _____ | ABRASIVE BLASTING | (g) _____ | KILN | (g) _____ | LOADING OR UNLOADING | (g) _____ | SWEAT |
| (d) _____ | OTHER — SYSTEM | (h) _____ | HEAT-TREATING | (h) _____ | BATCHING | (h) _____ | OTHER METALLIC |
| | | (i) _____ | OTHER | (i) _____ | MIXER (SOLIOS) | (i) <u>1</u> | GLASS |
| | | (j) _____ | | (j) _____ | OTHER | (j) _____ | OTHER NON METALLIC |
| 17. NO. OF UNITS | GENERAL OPER. EQUIP. | 17. NO. OF UNITS | GENERAL OPER. EQUIP. | 17. NO. OF UNITS | GENERAL OPER. EQUIP. | 18. NO. OF UNITS | OTHER EQUIPMENT |
| (a) _____ | CHEMICAL MILLING | (f) _____ | GALVANIZING | (k) _____ | ASPHALT BLOWING | (a) _____ | SPRAY PAINTING GUN |
| (b) _____ | PLATING | (g) _____ | IMPREGNATING | (l) _____ | CHEMICAL COATING | (b) _____ | SPRAY BOOTH OR ROOM |
| (c) _____ | DIGESTER | (h) _____ | MIXING OR FORMULATING | (m) _____ | COFFEE ROASTER | (c) _____ | FLOW COATING |
| (d) _____ | DRY CLEANING | (i) _____ | REACTOR | (n) _____ | SAWS & PLANERS | (d) _____ | FIBERGLASSING |
| (e) _____ | FORMING OR MOLDING | (j) _____ | STILL | (o) _____ | STORAGE TANK | (e) _____ | OTHER |

CONTROL DEVICES (ENTER NUMBER OF UNITS OF EQUIPMENT IN SPACES IN COLUMNS. COMPLETE A FORM R FOR EACH ENTRY.)

| 19. NO. OF UNITS | CONTROL DEVICE | 20. NO. OF UNITS | CONTROL DEVICE | 21. NO. OF UNITS | CONTROL DEVICE | 22. NO. OF UNITS | CONTROL DEVICE |
|------------------|------------------------|------------------|------------------|------------------|----------------|------------------|--------------------|
| (a) _____ | SPRAY CURTAIN | (a) _____ | AIR WASHER | (a) _____ | ABSORBER | (a) _____ | DEMISTER |
| (b) _____ | CYCLONE | (b) _____ | WET COLLECTOR | (b) _____ | ADSORBER | (b) _____ | BAGHOUSE |
| (c) _____ | MULTIPLE CYCLONE | (c) _____ | VENTURI SCRUBBER | (c) _____ | FILTER PADS | (c) _____ | ELEC. PRECIPITATOR |
| (d) _____ | INERTIAL COLL. — OTHER | (d) _____ | | (d) _____ | AFTERBURNER | (d) _____ | OTHER |

| | | | |
|---|---------------------------------------|---|--|
| 23. BASIC EQUIPMENT COST (Estimate) <u>2,800,000</u> | 24. CONTROL EQUIPMENT COST (Estimate) | 25. DAILY HOURS <u>24 hrs.</u> FROM _____ AM to _____ PM | 26. DAYS OF OPERATION (Circle) <u>(S)</u> <u>(M)</u> <u>(T)</u> <u>(W)</u> <u>(T)</u> <u>(F)</u> <u>(S)</u> |
| 27. ESTIMATED STARTING DATE OF CONSTRUCTION: <u>Jan., 1993</u> | | 28. ESTIMATED COMPLETION DATE OF CONSTRUCTION: <u>Feb., 1993</u> | |

| 29. RAW MATERIALS (List starting material used in process) AND FUELS (Type and amount) | ANNUAL AMT. UNITS | 30. PRODUCTS (List End Products) | ANNUAL PROD. tons UNITS |
|--|-------------------|----------------------------------|-------------------------|
| Nat. Gas | 166500 MFC | | |
| Sand | 33300 tons | Glass Containers | 53800 |
| Soda Ash | 10300 tons | | |
| Limestone | 8600 tons | | |
| Salt Cake | 42 tons | | |
| Carbocite | 49 tons | | |
| Iron Chromites & Iron Pyrites | 51 tons | | |

Notice of Construction Application

FORM P

STACKS OR VENTS (LIST NUMBER, TYPE, AND SIZE OF VENT)

| 31. NO. OF UNITS | DESCRIPTION OF OPENING | 32. HEIGHT ABOVE GRADE (FT.) | 33. VOLUME EXHAUSTED (ACFM) | DIMENSIONS (INCHES) | |
|------------------|----------------------------|------------------------------|-----------------------------|----------------------|-----------|
| | | | | 34. LENGTH (OR DIAM) | 35. WIDTH |
| (a) | STACKS | 70 | 6000 | 48 ϕ | -- |
| (b) | FLUES | | | | |
| (c) | PROCESS OR GENERAL EXHAUST | | | | |
| (d) | PROCESS OR GENERAL VENTS | | | | |
| (e) | SKYLIGHT OR WINDOW | | | | |
| (f) | EXHAUST HOOD | | | | |
| (g) | OTHER | | | | |

FLOW DIAGRAM

36. FLOW DIAGRAM INSTRUCTIONS:

- (a) FLOW DIAGRAM MAY BE SCHEMATIC. ALL EQUIPMENT SHOULD BE SHOWN WITH EXISTING EQUIPMENT SO INDICATED.
- (b) SHOW FLOW DIAGRAM OF PROCESS STARTING WITH RAW MATERIALS USED AND ENDING WITH FINISHED PRODUCT.
- (c) IF MORE THAN ONE PROCESS IS INVOLVED TO MAKE FINISHED PRODUCT, SHOW EACH PROCESS AND WHERE THEY MERGE.
- (d) INDICATE ALL POINTS IN PROCESS WHERE GASEOUS OR PARTICULATE POLLUTANTS ARE EMITTED.
- (e) FLOW CHART CAN BE ATTACHED SEPARATELY IF NECESSARY. (DRAWINGS MAYBE SUBMITTED INSTEAD IF DESIRED).
- (f) SHOW PICKUP AND DISCHARGE POINTS FOR HANDLING OR CONVEYING EQUIPMENT.

Data similar to information already on file

37. LIST OF ATTACHMENTS AND ACCOMPANYING DATA OR COMMENTS:

| | | |
|--------------------------------|--|-------------------------|
| Form S | Process Change | Environmental Checklist |
| Form P | Schedule of Equip. | Tables 1, 4, 21 |
| Plans/Specifications | Emission estimates | |
| Desc. of Glass Melting Process | Published Article "How 100% Oxygen Firing Impacts Regenerative Furnaces" | |

38. CERTIFICATION:

I, THE UNDERSIGNED, DO HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS APPLICATION AND THE ACCOMPANYING FORMS, PLANS, AND SUPPLEMENTAL DATA DESCRIBED HEREIN IS, TO THE BEST OF MY KNOWLEDGE, ACCURATE AND COMPLETE.

39. SIGNATURE

John R. Mino

40. DATE

6/12/92

41. TYPE OR PRINT NAME

John R. Mino

42. TITLE

Senior Engr - Envirommental

43. PHONE

317/741-7116

PUGET SOUND AIR POLLUTION CONTROL AGENCY

ENGINEERING DIVISION

200 WEST MERCER STREET

SEATTLE, WASHINGTON 98119

(206) 296-7334

Furnace

Notice of Construction and Application for Approval

*Note: Information required by Section 1a must be completed, for this form to be accepted for review.

FOR BASIC PROCESS EQUIPMENT

FORM S

PLEASE CONSULT INSTRUCTION SHEET BEFORE FORWARDING

DATE _____ N/C # _____

*a. COMPLETE THE SECTIONS INDICATED ☒ 1 ☒ 2 ☒ 3 ☒ 4 ☒ 5 ☐ 6 ☒ 7 ☒ 8 ☒ 9 ☐ 10 ☐ 11 ☐ 12

b. COMPANY (OR OWNER) INSTALLATION ADDRESS
5801 E. Marginal Way South

c. COMPANY (OR OWNER) NAME
Ball-InCon Glass Packaging Corp.

d. APPLICANT
Ball-InCon Glass Packaging Corp.

e. PREPARED BY: (Name and title)
John R. Mino, Senior Engr - Environmental

f. PREPARED BY: (Signature) _____ g. PHONE
317-741-7116

a. PROCESS EQUIPMENT DATA

b. Title
Glass Melting Furn. #3

c. Make and Model
Ball-InCon Design

d. Dimensions (LxWxH) depth
36.8' x 18' x 48"

e. No. of units; rated capacity
1

f. _____
205 tons/day

g. Auxiliary Equipment
None

h. Connected To:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. Equipment

h. Connected To:

a. BURNER DATA

b. Type of Burner, Fuel
Undecided

c. Make and Model
Undecided

d. Rated Capacity
Unknown

e. No. of units; ignition method
Unknown

f. _____

g. CFM Exhausted (Temperature)
Unknown (°F)

h. Connected To:

a. STACKS, VENTS AND EXHAUST OPENINGS

b. Type of Vent
Stack

c. Dimensions
49" diam.

d. _____
70 ft. high

e. No. of vents; Material of construction
1

f. _____
Steel

g. CFM Exhausted (Temperature)
6000 CFM (400°F)

h. Connected To:

a. TANKS AND KETTLES

b. Type of Tank, Material

c. Dimensions (LxWxH) in inches

d. Surface Area (Sq. Ft.)
☐ Closed ☐ Open

e. No. of tanks; Material of construction

f. _____

g. Auxiliary Equipment

h. Connected To:

a. FAN DATA

b. Type of Fan (Designate Blade)
Natural Draft

c. Make and Model
N.A.

d. Motor Data
N.A. RPM

e. No. of fans; Material of construction
N.A.

f. _____

g. CFM Exhausted (Temperature)
6000 CFM 400 °F

h. Connected To:

a. OVENS AND FURNACES

b. Type of Oven or Furnace
Cross Fired Oxy-Fuel

c. Make and Model
Ball-InCon Design

d. Rated Capacity
205 tons

e. No. of ovens; Material of construction
1

f. _____
High Temp. Refractory

g. CFM Exhausted (Temperature)
2250 (°F)

h. Connected To:

a. OPERATIONAL DATA

b. Type of Operation
☐ Batch ☒ Continuous

c. Operating Schedule (Normal)
7 days/wk
SHIFTS DAY ☐ 1 ☐ 2 ☒ 3

d. Mode of Operations
☐ Manual ☐ Auto ☒ Semi-Aut

e. Duration of Batch (Hrs/Batch)

f. _____

g. Daily Number of Batches
66 (Ave) 71 (Max)

h. _____

a. CONVEYOR DATA

b. Type of Conveyor
(Pneumatic, Bolt)

c. Make and Model

d. Capacity

e. Dimensions (LxWxH)

f. _____

g. No. of Pickups No. of Discharge Pts

h. Connected To:

a. GAS FLOW

b. ACTUAL CFM

c. SCFM (Reg I Standard)

d. TEMPERATURE (°F)
IN _____ OUT _____

e. PRESSURE DROP

f. EFFICIENCY

g. INLET AND OUTLET POLLUTANT CONCENTRATIONS

h. _____

a. ADDITIONAL DATA

b. ☒ ATTACH BROCHURE

c. ☒ ATTACH PLANS/SPECS

d. ☒ ATTACH EMISSION ESTIMATE (show calculation)

e. ☒ SUBMIT NARRATIVE DESCRIPTION OF PROCESS

f. ☐ SUBMIT SOURCE TEST DATA

g. ☐ SUBMIT MODELING DATA

h. ☒ ATTACH A SCHEDULE OF EQUIPMENT WITH MAKE, MODEL, CAPACITY

i. ☒ *File 114.21*

j. ☐

k. ☐

l. ☐

Ball-InCon Glass Packaging Corp.
Seattle, Washington

Form S, Item 12

C. Plans/Specifications

Furnace #3 is currently scheduled for a major rebuild in January, 1993. In an effort to reduce costs and improve environmental performance of this furnace, Ball-InCon is proposing to enlarge the furnace and convert it to a 100 percent oxygen-fuel system. Recent conversions on other glass furnaces in the industry has shown that the environmental benefits include reduced NO_x and particulate emissions. Although the particulate emissions on a per ton basis are expected to be reduced by approximately 25%, the increased capacity and production from the furnace is expected to increase total annual emissions of particulates from 15.6 tons to 17.7 tons or an increase of 2.1 tons. However, the conversion will also result in major reduction of NO_x from 333.6 tons to 76.1 tons for a total annual reduction of 257.5 tons, which we wish to bank for future use.

E. Description of the Glass Container Manufacturing Process

The major glass-making raw materials, consisting of sand, soda ash and limestone, along with lesser quantities of colorants and refining agents, are received by rail or truck and unloaded into storage silos until needed. Recycled glass, called cullet, from our own process (rejects) and purchased from recycling centers and other outside sources is also a major raw material. Batch materials in carefully weighed proportions are thoroughly mixed and conveyed to storage bins above the glass melting furnace. Mixed batch is continuously fed into one end of the glass melting furnace, which is essentially a refractory box constructed of special high-temperature resistant refractories, containing a bath of molten glass at a temperature of about 2500° F.

Of the five furnaces at the Seattle facility, two (#1 and #2) are heated entirely by electricity introduced by way of electrodes immersed in the molten glass and are capable of melting only clear glass. For furnaces #4 and #5, most of the energy for melting and refining the glass is supplied by natural gas fired burners, with additional energy from electrodes immersed in the glass as with electric melting. The change to furnace #3 is described below under the heading "Process Change". Temperatures above the glass melt reach 2700 to 2800° F. The gas-fired furnaces are of the regenerative type, in which combustion products are

exhausted into one or two chambers containing refractory brick for reclamation of heat; air for combustion passes through the other side and into the furnace to be mixed with fuel for heating the furnace. Every 15 minutes, the process is reversed, with the previously heated chamber now used to preheat combustion air and hot combustion products pass through the cooler side to again heat the refractory packing. Fuel flow and air/fuel ratio are controlled to maintain proper furnace temperatures and efficient combustion. Induced draft fans are used to aid in exhausting gases, which contain a small concentration of particulate matter, through a stack to the atmosphere.

Chemical reactions occur at these high temperatures over a period of several hours to form glass. The refining process (removal of trapped gases and bubbles) and homogenization of the glass takes place both during and after melting. Nearly bubble-free glass is continually withdrawn from the other end of the furnace and flows through shallow refractory channels called forehearth to the forming machines where bottles and jars are made. The freshly formed containers are heat-treated to remove any stresses in the forming process, inspected, packed and shipped to our customers. This operation goes on 24 hours a day, 7 days a week, with a short break at Christmas during which production is curtailed but the furnaces remain near operating temperatures. The furnaces are only shut down at the time of a major repair for rebricking, typically every five to seven years.

Process Change

The proposed modification for furnace #3 during the scheduled rebuild is to convert the melter from a regenerative combustion air firing system with auxiliary electric boosting to a 100 percent oxygen firing system. Conversion of regenerative furnaces to oxy-fuel systems has proven environmental benefits of substantial reduction of NO_x and significant reduction of particulate emissions. A conservative estimate would indicate that NO_x emissions will be reduced approximately 85% and particulate emissions will decrease approximately 25%.

H. Schedule of Equipment

The modifications and enlargement to furnace #3 is planned for January, 1993.

Ball-InCon Glass Packaging Corp.
Seattle, Washington

Form S - Item 12 (d)

Emission Estimates: Based on test conducted 1/10/91

Particulates 3.16 lb/hr.
Pull Rate 4.44 tons/hr.

$$\text{Emission Factor} = 3.16 \frac{\text{lbs}}{\text{hr}} \div 4.44 \frac{\text{tons}}{\text{hr}} = 0.71 \text{ lbs/ton}$$

Based on results of Gallo¹ conversion, expect 25% reduction

$$\text{New Emission Factor} 0.71 \frac{\text{lbs}}{\text{ton}} \times 0.75\% = 0.53 \text{ lbs/ton}$$

Max. Pull Rate 7.95 tons/hr

$$\text{Max. Particulate Emissions} = 7.95 \frac{\text{tons}}{\text{hr}} \times 0.53 \frac{\text{lbs}}{\text{ton}} = 4.21 \text{ lbs/hr.}$$

Nitrogen Oxides (NO_x) Based on tests conducted 12/11/89

NO_x 67.3 lbs/hr

$$\text{Emission Factor} = 67.3 \frac{\text{lbs}}{\text{hr}} \div 4.44 \frac{\text{tons}}{\text{hr}} = 15.15 \text{ lbs/ton}$$

Based on results of Gallo¹ conversion, assume 85% Reduction

$$\text{New Emission Factor} 15.15 \frac{\text{lbs}}{\text{ton}} \times 0.15 = 2.27 \text{ lbs/ton}$$

$$\text{Maximum NO}_x = 7.95 \frac{\text{tons}}{\text{hr}} \times 2.27 \frac{\text{lbs}}{\text{ton}} = 18.1 \text{ lbs/hr}$$

Emission Factors for SO_x and CO should remain the same

Annual Emission Estimates

| | <u>Existing 1991</u> | <u>Proposed Oxy-Fuel</u> |
|------------------------------------|----------------------|--------------------------|
| Furnace Glass Area | 440 ft ² | 660 ft ² |
| Max Tonnage | 135 T/D | 205 T/D |
| Operating Days | 350 | 350 |
| Annual Tons | 44044 | 66728 |
| Particulates | 15.6 tons | 17.7 tons +2.1 tons |
| Nitrogen Oxides (NO _x) | 333.6 tons | 76.1 tons -257.5 tons |

Ball-InCon Glass Packaging Corp.
Seattle, Washington
Page #2

Form S - Item 12 (d) Cont'd.

References

1. Geoffrey Tuson et All, "How 100% Oxygen Firing Impacts Regenerative Melters" pp. 12-26 Glass Industry March, 1992.
2. J. T. Brown, R. D. Moore, "Conversion of a Large Container Furnace From Regenerative Firing to Direct Oxy-Fuel Combustion", Proceedings of 51st Conference on Glass Problems, pp. 202-217 American Ceramic Society, Westerville, 1991.

TABLE 1
EMISSION SOURCES

List all sources, including this application, of air contaminants on applicant's property. If applicant has submitted this information in an earlier emission inventory, it will not be necessary to duplicate the requested information. Instead, indicate that this page has been submitted and list only changes from the emission inventory and list new source data.

Data for other sources currently on file.

~~ALL SOURCES~~ OXY-FUEL FURN #3

STACKS ONLY

| Emission Point Number (from plot plan) | List Pollutant Emissions (chemical composition) and Weight of Each | Flow Rate of Each Listed Emission | |
|---|--|--------------------------------------|-------------|
| | | Gaseous | Particulate |
| #3 | Particulate | | 4.21 |
| | | | |
| | NO _x | | 18.1 |
| | | | |
| | SO _x | | 10.8 |
| | | | |
| | CO | | Neg. |
| | | | |
| | | | |

| Emission Point Number (from plot plan) | Stack Height Above Ground (ft) | Stack Internal Diameter at Exit (ft) | Temp. (°F) | Velocity (ft/sec) | Moisture (%) |
|---|--------------------------------------|--|---------------|----------------------|-----------------|
| #3 | 70 | 4.08 | 350 | 7.65 | 25 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Please enclose the following information:

1. Emissions other than through-stacks (horizontal vents, etc.).
2. Stack heights above supporting or adjacent structures.
3. Dimensions of non-circular stacks.
4. Results of tests indicating average particle size, density, etc.

Table 4 COMBUSTION UNITS

Please note: BACT for new boilers/
heaters ≥ 10 MMBH is:
0.10 lb NO_x/MMBTU for gas
0.20 lb NO_x/MMBTU for #2 oil
0.30 lb NO_x/MMBTU for other fuel
and for ≥ 100 MMBH is: 10 ppm w/CEM

OPERATIONAL DATA

| | |
|--|--|
| Number from flow diagram: <u>Furnace #3</u> | Model Number (if available): <u>N.A.</u> |
| Name of device: <u>Glass Melting Furnace #3</u> | Manufacturer: <u>Ball-InCon</u> |
| Design heat input rating: <u>Unknown</u> Btu/hour each | Number of units: <u>Undetermined</u> |

CHARACTERISTICS OF INPUT

| Fuel | Type | Grade or Spec. | % Sulfur | Annual Consumption | Units | Rated Hourly Consumption |
|------|-------|----------------|----------|--------------------|---------|--------------------------|
| | Oil | | | | (gal) | |
| | Gas | | | | (therm) | |
| | Wood | | | | (ton) | |
| | Other | | | | () | |

| | | | |
|---|-------------------------|----------------------------------|------------------------------------|
| Gross Heating Value of Waste Material (wet basis if applicable) | Btu/lb | Air Supplied for Waste Material: | |
| | | Minimum SCFM (70°F & 14.7 psia) | Maximum SCFM (70°F & 14.7 psia) |
| Waste Material or Contaminated Gas | Total Flow Rate (lb/hr) | | Inlet Temperature (°F) |
| | Minimum Expected | Design Maximum | Minimum Expected Design Maximum |

Chemical Composition

| Waste Material* | Material | Min. Value Expected lb/hr | Avg. Value Expected lb/hr | Design Maximum lb/hr |
|-----------------|----------------|---------------------------|---------------------------|----------------------|
| | 1. Natural Gas | --- | 10,500 CFH | 19,700 CFH |
| | 2. | | | |
| | 3. | | | |
| | 4. | | | |
| | 5. | | | |

| | | | | |
|------------------------------|-------------|--------------------|---------------------------------|---------------------------------|
| Gross Heating Value of Fuel: | Btu/lb | Oxygen | Minimum SCFM (70°F & 14.7 psia) | Maximum SCFM (70°F & 14.7 psia) |
| | <u>1034</u> | Supplied for Fuel: | <u>21,000 CFH</u> | <u>39,400 CFH</u> |

*Describe how waste material is introduced into combustion unit on an attached sheet. Supply drawings, dimensioned and to scale to show clearly the design and operation of the unit.

(over)

Table 4
(continued)

COMBUSTION UNITS

| CHARACTERISTICS OF OUTPUT | | | | |
|---|---|--|--|--|
| Flue Gas Released | Chemical Composition | | | |
| | Material | Min. Value Expected lb/hr | Avg. Value Expected lb/hr | Design Maximum lb/hr |
| | 1. | | | |
| | 2. | | | |
| | 3. | | | |
| | 4. | | | |
| | 5. | | | |
| Temperature at Stack Exit °F <u>300-400</u> | | Total Flow Rate (lb/hr) Minimum Expected Maximum Expected <u>Undetermined</u> | | Velocity at Stack Exit (ft/sec) Minimum Expected Maximum Expected <u>6.4</u> <u>9.6</u> |
| COMBUSTION UNIT CHARACTERISTICS | | | | |
| Chamber Volume from Drawing ft ³ <u>Undetermined</u> | Chamber Velocity at Average Chamber Temperature ft/sec <u>Undetermined</u> | | Average Chamber Temperature °F <u>2650-2750</u> | |
| Average Residence Time sec <u>Undetermined</u> | Exhaust Stack Height ft <u>70</u> | | Exhaust Stack Diameter ft <u>4.08</u> | |
| ADDITIONAL INFORMATION FOR CATALYTIC COMBUSTION UNITS | | | | |
| Number and Type of Catalyst Elements <u></u> | Catalytic Bed Velocity ft/sec <u></u> | | Max. Flow Rate per Catalytic Unit (Manufacturer's Specifications) Specify Units <u></u> | |

Attach separate sheets as necessary providing a description of the combustion unit, including details regarding principle of operation and the basis for calculating its efficiency. Supply an assembly drawing, dimensioned and to scale, to show clearly the design and operation of the equipment. If the device has bypasses, safety valves, etc., specify when such bypasses are to be used and under what conditions. Submit explanations on controls for temperature, air flow rates, fuel rates, and other operating variables.

TABLE 21
FURNACE DATA SHEET

| Point Number (from flow diagram) Furn #3 - Proposed | | Furnace Type | | |
|--|--|---|-------------------------------------|--|
| Furnace Manufacturer Ball-InCon Design | | <input type="checkbox"/> Electric <input type="checkbox"/> Arc | | |
| Model Number N.A. | | <input type="checkbox"/> Reverberatory <input type="checkbox"/> Channel | | |
| Size (dimensions) 18'-0" x 36'-10" Glass Depth - 46" | | <input type="checkbox"/> Crucible <input type="checkbox"/> Coreless | | |
| | | <input type="checkbox"/> Pot | | |
| | | <input type="checkbox"/> Annealing or HT <input type="checkbox"/> Cupola | | |
| | | <input type="checkbox"/> Reheat <input type="checkbox"/> Retort | | |
| | | <input type="checkbox"/> Blast <input type="checkbox"/> Oxygen-Fuel <input checked="" type="checkbox"/> Other | | |
| FURNACE OPERATION | | | | |
| Metal Type Melted Glass | | Type of Heat Additives | | |
| Melting Capacity (tons/hr) 8.54 | | Quantity of Heat Additives | | |
| Holding Capacity (tons) | | Pouring Temperature (°F) | | |
| Charge Makeup Sand, soda ash, limestone Fining agents, colorants | | Afterburner (Btu/hr) | | |
| | | Ductile Iron Production (tons/hr) | | |
| Charging Method Demand | | Method Temperature Control | | |
| Oxygen Injection N.A. | | Tuyere Air (SCFM*) | | |
| CHARACTERISTICS OF FUEL INPUT | | | | |
| Fuel Type | Chemical Composition (% by weight) | Inlet Air Temp (°F) | Fuel Flow Rate (SCFM* or lbs/hr) | |
| Natural Gas | N.A. | Ambient | Average Unknown | Design Max Unknown |
| | | Total Air Supplied (SCFM*) | | Gross Heating Value of Fuel (specify units) |
| | | Minimal | | 1034 Btu/Ft ³ |
| CHARACTERISTICS OF STACK OUTPUT | | | | |
| Material Emitted | Chemical Composition and Rate of Release | | | |
| Particulate | 95% sodium sulfate 5% calcium sulfate 4.21 lbs/hr. | | | |
| STACK PARAMETERS | | | | |
| Stack Diameter | Stack Height | Temp (°F) | Velocity | Moisture % |
| 49 in. | 70' | 300-400 | 6.4-9.6 | 20-35% |

Supply assembly drawing, dimensions, and to-scale, in as many sections as needed to clearly show the operation of the furnace.

*STANDARD CONDITIONS: 70°F, 14.7 PSIA.

RECOMMENDATION OF REVIEWING ENGINEER

Company Ball-InconAssigned to HAW/FLAN/C # 4546Source Mod Glass Melt Furnace #3Date Assigned 6/17/92Rec'd 6/15/92Hereby Recommended: Dust Collection SysApproval ☐Conditional Approval ☐Disapproval ☐

BACT/LAER Analysis:

Circle All Applicable:

NSPS PSD CEM Offset
 NESHAPS I/O/M Publish Class I
 Visibility Model Monitor Screening
 Analysis Req'd Req'd Req'd
 Records Report Source Test

Lead Agency: PSAPCA

other

Source Located In: TSP-AA

TSP-NAA

Ozone-AA

CO
Ozone-NAASO₂-AASO₂-UNCL

Emission Calculations: TABLE 1

#3 Furnace
 Particulate $4.21 \text{ lb/hr} \times 8760 \text{ hr/yr} \div 2000 \text{ lb/t} = 18.4 \text{ TPY}$ 16.3
 SO₂ 10.8 = 47.3 TPY Same
 CO 18.1 = 79.3 TPY 336.3
 VOC Neg = Neg Same
 VOC Neg = Neg Same

#4547 Normally Vented Internally

$17,000 \frac{\text{ft}^3}{\text{min}} \times 60 \times 24 \times 365 \frac{\text{min}}{\text{yr}} \times \frac{.01 \text{ gr/ft}^3}{2000 \text{ gr/lb}} \times \frac{1}{2000 \text{ lb/t}} = 6.4 \text{ TPY Part}$
 98% Eff BM \neq 90% Eff existing cyclone $\Rightarrow 6.4 \left(\frac{1.00 - .90}{1.00 - .98} \right) = 32 \text{ TPY} (\Rightarrow \text{Reduction} = 25.6 \text{ TPY})$

Specific Conditions: #4546 only

Source test for Part \neq NO_x
 to verify emission estimates for
 Banking Request
 PM-10 source test
 7E Nox source test

Emission Summary

Emission: Increase Decrease No Change
 + - (blank)

| Pollutant | Part | SO ₂ | NO _x | CO | VOC |
|-----------|-------|-----------------|-----------------|-----------|-----------|
| Tons/Year | + 2.1 | No Change | -257.5 | No Change | No Change |
| BACT Met | -25.6 | | | | |
| AQ Stds. | | | | | |

Review by Paul L. AustinDate 7-7-92Approval [Signature]Date 7/7/92Approval D84Date 7/13/92



PUGET SOUND AIR POLLUTION CONTROL AGENCY

ENGINEERING DIVISION
200 WEST MERCER, ROOM 205, SEATTLE, WASHINGTON 98119-3958
(206) 344-7334

Notice of Construction and Application for Approval

FORM P
SIDE 1

Be sure to complete items 39, 40, 41, & 43 before submitting Form P.

(AGENCY USE ONLY)

DATE 6/15/92 N/C NUMBER 4547
REG. NO. RECEIVED
SIC. NO. 11650 COS. NO. RECEIVED
GRID NO. UTM

| | | |
|--|--|---|
| 1. TYPE OF BUILDING (Check) <input type="checkbox"/> New <input checked="" type="checkbox"/> Existing | 2. STATUS OF EQUIPMENT (Check) <input checked="" type="checkbox"/> New <input type="checkbox"/> Existing <input type="checkbox"/> Altered <input type="checkbox"/> Relocation | 7. APPLICANT Same |
| 3. COMPANY (OR OWNER) NAME Ball-InCon Glass Packaging Corp. | | 8. APPLICANT ADDRESS Same |
| 4. COMPANY (OR OWNER) MAILING ADDRESS 5801 East Marginal Way South | | 9. INSTALLATION ADDRESS Same |
| 5. NATURE OF BUSINESS Glass Container Manufacturer | | 10. TYPE OF PROCESS Machining, metal working |

EQUIPMENT (ENTER ONLY NEW EQUIPMENT OR CHANGES. ENTER NUMBER OF UNITS OF EQUIPMENT IN COLUMN 'NO. OF UNITS.' COMPLETE FORM 'S' FOR EACH ENTRY.)

| 11. NO. OF UNITS | SPACE HEATERS OR BOILERS (Complete Form S-A) | 14. NO. OF UNITS | OVENS | 15. NO. OF UNITS | MECHANICAL EQUIP. | 16. NO. OF UNITS | MELTING FURNACES |
|------------------|--|------------------|-----------------------|------------------|----------------------|------------------|-----------------------|
| (a) | | (a) | CORE BAKING OVEN | (a) | AREAS | (a) | POT |
| 12. NO. OF UNITS | INCINERATORS (Complete Form S-B) | (b) | PAINT BAKING | (b) | BULK CONVEYOR | (b) | REVERBERATORY |
| (a) | | (c) | PLASTIC CURING | (c) | CLASSIFIER | (c) | ELECTRIC INDUC/RESIST |
| 13. NO. OF UNITS | OTHER SYSTEMS | (d) | LITHO COATING OVEN | (d) | STORAGE BIN | (d) | CRUCIBLE |
| (a) | | (e) | DRYER | (e) | BAGGING | (e) | CUPOLA |
| (b) | DEGREASING, SOLVENT | (f) | ROASTER | (f) | OUTSIDE BULK STORAGE | (f) | ELECTRIC ARC |
| (c) | ABRASIVE BLASTING | (g) | KILN | (g) | LOADING OR UNLOADING | (g) | SWEAT |
| (d) | OTHER - SYSTEM | (h) | HEAT-TREATING | (h) | BATCHING | (h) | OTHER METALLIC |
| | | (i) | OTHER | (i) | MIXER (SOLIDS) | (i) | GLASS |
| | | (j) | | (j) | 1 OTHER | (j) | OTHER NON METALLIC |
| 17. NO. OF UNITS | GENERAL OPER. EQUIP. | 17. NO. OF UNITS | GENERAL OPER. EQUIP. | 17. NO. OF UNITS | GENERAL OPER. EQUIP. | 18. NO. OF UNITS | OTHER EQUIPMENT |
| (a) | CHEMICAL MILLING | (f) | GALVANIZING | (k) | ASPHALT BLOWING | (a) | SPRAY PAINTING GUN |
| (b) | PLATING | (g) | IMPREGNATING | (l) | CHEMICAL COATING | (b) | SPRAY BOOTH OR ROOM |
| (c) | DIGESTER | (h) | MIXING OR FORMULATING | (m) | COFFEE ROASTER | (c) | FLOW COATING |
| (d) | DRY CLEANING | (i) | REACTOR | (n) | SAWS & PLANERS | (d) | FIBERGLASSING |
| (e) | FORMING OR MOLDING | (j) | STILL | (o) | STORAGE TANK | (e) | OTHER |

CONTROL DEVICES (ENTER NUMBER OF UNITS OF EQUIPMENT IN SPACES IN COLUMNS. COMPLETE A FORM R FOR EACH ENTRY.)

| 19. NO. OF UNITS | CONTROL DEVICE | 20. NO. OF UNITS | CONTROL DEVICE | 21. NO. OF UNITS | CONTROL DEVICE | 22. NO. OF UNITS | CONTROL DEVICE |
|------------------|------------------------|------------------|------------------|------------------|----------------|------------------|--------------------|
| (a) | SPRAY CURTAIN | (a) | AIR WASHER | (a) | ABSORBER | (a) | DEMISTER |
| (b) | CYCLONE | (b) | WET COLLECTOR | (b) | ADSORBER | (b) | BAGHOUSE |
| (c) | MULTIPLE CYCLONE | (c) | VENTURI SCRUBBER | (c) | FILTER PADS | (c) | ELEC. PRECIPITATOR |
| (d) | INERTIAL COLL. - OTHER | (d) | | (d) | AFTERBURNER | (d) | OTHER |

| | | | |
|-------------------------------------|--|---|--|
| 23. BASIC EQUIPMENT COST (Estimate) | 24. CONTROL EQUIPMENT COST (Estimate) 125,000 | 25. DAILY HOURS FROM <u>24</u> AM to <u>PM</u> | 26. DAYS OF OPERATION (Circle) <u>S</u> <u>M</u> <u>T</u> <u>W</u> <u>T</u> <u>F</u> <u>S</u> |
|-------------------------------------|--|---|--|

| | |
|--|--|
| 27. ESTIMATED STARTING DATE OF CONSTRUCTION: June 1 | 28. ESTIMATED COMPLETION DATE OF CONSTRUCTION: July 1 |
|--|--|

| 29. RAW MATERIALS (List starting material used in process) AND FUELS (Type and amount) | ANNUAL AMT. Pieces/UNITS | 30. PRODUCTS (List End Products) | ANNUAL PROD. Pieces/UNITS |
|--|-----------------------------|----------------------------------|------------------------------|
| ss forming molds | 140,000 | Glass forming molds | 140,000 |
| (b) | | (b) | |
| (c) | | (c) | |
| (d) | | (d) | |
| (e) | | (e) | |
| (f) | | (f) | |
| (g) | | (g) | |

Notice of Construction Application

FORM P

STACKS OR VENTS (LIST NUMBER, TYPE, AND SIZE OF VENT)

| 31. NO. OF UNITS | DESCRIPTION OF OPENING | 32. HEIGHT ABOVE GRADE (FT.) | 33. VOLUME EXHAUSTED (ACFM) | DIMENSIONS (INCHES) | |
|------------------|----------------------------|------------------------------|-----------------------------|----------------------|-----------|
| | | | | 34. LENGTH (OR DIAM) | 35. WIDTH |
| (a) | STACKS | | | | |
| (b) | FLUES | | | | |
| (c) | PROCESS OR GENERAL EXHAUST | | | | |
| (d) | PROCESS OR GENERAL VENTS | | | | |
| (e) | SKYLIGHT OR WINDOW | | | | |
| (f) | EXHAUST HOOD | | | | |
| (g) | OTHER | 12' | Normally vented | 30 | 30 |

FLOW DIAGRAM internally

36. FLOW DIAGRAM INSTRUCTIONS: Attached

- (a) FLOW DIAGRAM MAY BE SCHEMATIC. ALL EQUIPMENT SHOULD BE SHOWN WITH EXISTING EQUIPMENT SO INDICATED.
- (b) SHOW FLOW DIAGRAM OF PROCESS STARTING WITH RAW MATERIALS USED AND ENDING WITH FINISHED PRODUCT.
- (c) IF MORE THAN ONE PROCESS IS INVOLVED TO MAKE FINISHED PRODUCT, SHOW EACH PROCESS AND WHERE THEY MERGE.
- (d) INDICATE ALL POINTS IN PROCESS WHERE GASEOUS OR PARTICULATE POLLUTANTS ARE EMITTED.
- (e) FLOW CHART CAN BE ATTACHED SEPARATELY IF NECESSARY. (DRAWINGS MAYBE SUBMITTED INSTEAD IF DESIRED).
- (f) SHOW PICKUP AND DISCHARGE POINTS FOR HANDLING OR CONVEYING EQUIPMENT.

37. LIST OF ATTACHMENTS AND ACCOMPANYING DATA OR COMMENTS:

| | |
|------------------------|-------------------------|
| Form R | Plans/Specs |
| Form P | Table II |
| Description of Process | Environmental Checklist |
| Flow Diagram | |

38. CERTIFICATION:

I, THE UNDERSIGNED, DO HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS APPLICATION AND THE ACCOMPANYING FORMS, PLANS, AND SUPPLEMENTAL DATA DESCRIBED HEREIN IS, TO THE BEST OF MY KNOWLEDGE, ACCURATE AND COMPLETE.

39. SIGNATURE

M. C. Gridley

40. DATE

6/12/92

41. TYPE OR PRINT NAME

M. C. Gridley

42. TITLE

Mgr. Environ. & Glass Technology

43. PHONE

317/74177145